

UNITED STATES INTERNATIONAL TRADE COMMISSION

Washington, D.C.

In the Matter of

**CERTAIN PHOTOVOLTAIC CONNECTORS AND
COMPONENTS THEREOF**

Inv. No. 337-TA-1365

**ORDER NO. 16: CONSTRUING CERTAIN TERMS OF THE ASSERTED CLAIMS
OF THE PATENTS AT ISSUE**

(February 20, 2024)

This order addresses the construction of certain disputed claim terms in U.S. Patent Nos. U.S. Patent Nos. 10,553,739 (the “’739 patent), 10,992,254 (the “’254 patent), and 11,689,153 (the “’153 patent) (collectively, “Asserted Patents”).

I. BACKGROUND

The Commission instituted this investigation to determine whether there is a violation of section 337 with respect to certain photovoltaic connectors portable and components thereof by reason of infringement of certain claims of the ’739 patent and the ’254 patent. *See* 88 Fed. Reg. 37905-06 (June 9, 2023) (“Notice of Investigation”). At the time of institution, the complaint alleged violations of 19 U.S.C. § 1337 by 8 respondents in the importation into the United States, sale for importation, and/or sale within the United States after importation of certain portable battery jump starters and components thereof by reason of infringement of certain claims of the ’739 patent and the ’254 patent. *See id.* On July 18, 2023, the undersigned issued an initial determination granting a motion by Complainant to amend its complaint and the Notice of Investigation to further include allegations of infringement based on certain claims of the ’153 Patent, which issued on June 27, 2023, against Respondents Voltage, LLC and Ningbo Voltage

Smart Production Co. *See* Order No. 5; *see also* Amended Complaint, EDIS Doc. ID 800563 (July 19, 2023).

The complainant is Shoals Technologies Group, LLC (“Shoals” or “Complainant”), and the Respondents are Hikam America, Inc., Hikam Electrónica de México, S.A. de C.V., Hikam Tecnología de Sinaloa, Hewtech Philippines Corp., Hewtech Philippines Electronics Corp., Hewtech (Shenzhen) Electronics Co., Ltd. (collectively, “Hikam”), Voltage, LLC, and Ningbo Voltage Smart Production Co. (collectively, “Voltage”) (together with Hikam, “Respondents”), Pursuant to the Procedural Schedule (Order No. 7), the parties filed a joint claim construction chart (EDIS Doc. ID 807044) on October 26, 2023. The parties filed opening claim construction briefs on November 2, 2023¹ (Complainant and Respondents) and November 9, 2023 (Staff) and the parties filed rebuttal claim construction briefs on November 16, 2023.² A *Markman* hearing was held on December 13, 2023. The parties filed an updated joint proposed claim construction chart on December 15, 2023, and an amended updated joint proposed claim construction chart on December 26, 2023.

For ease of reference, certain materials submitted by the parties shall be referred to as follows:

CIB	Complainant’s Initial Claim Construction Brief, EDIS Doc. ID 807736 (Nov. 3, 2023)
CRB	Complainant’s Rebuttal Claim Construction Brief, EDIS Doc. ID 808813 (Nov. 17, 2023)
RIB	Respondents’ Initial Claim Construction Brief, EDIS Doc. ID 807735 (Nov. 2, 2023)
RRB	Respondents’ Rebuttal Claim Construction Brief, EDIS Doc. ID 808806 (Nov. 16, 2023)

¹ Complainant’s brief was filed shortly after the 5:15 PM filing deadline and was thus deemed received on November 3, 2023. No party has raised an objection.

² Complainant’s brief was filed shortly after the 5:15 PM filing deadline and was thus deemed received on November 17, 2023. Again, no party raised an objection.

SB	Commission Investigative Staff’s Claim Construction Brief, EDIS Doc. ID 808222 (Nov. 9, 2023)
Joint Chart	Joint Proposed Claim Construction Chart, EDIS Doc. ID 807044 (Oct. 26, 2023)
Updated Joint Chart	Updated Joint Proposed Claim Construction Chart, EDIS Doc. ID 810975 (Dec. 26, 2023)
Tr.	Transcript of claim construction hearing, EDIS Doc. ID 810420 (Dec. 14, 2023)
Compl. Slides	Complainant’s <i>Markman</i> Presentation (EDIS Doc. ID 810489, Ex. 23 ³)
Resp. Slides	Respondents’ <i>Markman</i> Presentation (EDIS Doc. ID 810489, Ex. 24)

II. LEGAL STANDARDS

The scope of a patent claim is defined by the claim language. *Catalina Mktg. Int’l., Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 807 (Fed. Cir. 2002). In construing the claims, the court’s task is to “ascertain[] the meaning of the claim terms to one of ordinary skill in the art at the time of invention.” *Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings*, 370 F.3d 1354, 1361 (Fed. Cir. 2004). “[O]nly those [claim] terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.” *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999); *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Ltd. Matal*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (same).

To ascertain the meaning of claim terms at issue, courts rely on intrinsic evidence: the claims, specification, and prosecution history for the patent at issue. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313-14 (Fed. Cir. 2005); *Vitronics Corp. v. Conceptoronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996). The words of a claim “are generally given their ordinary and customary meaning.” *Phillips*, 415 F.3d at 1312. This is the meaning “that the term would have to a person

³ The parties’ presentations, which were filed with the December 15, 2023 Updated Joint Chart, are numbered as additional exhibits (Exs. 23 and 24) to Respondents’ *Markman* briefing.

of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application.” *Id.* at 1313.

Importantly, the person of ordinary skill in the art “is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification.” *Id.* The Federal Circuit has repeatedly confirmed that the specification is “the single best guide to the meaning of a disputed term.” *Id.* at 1315. The specification plays a primary role because it can function as “a concordance for the claims,” explaining the invention and defining the terms used in the claims. *Id.* (citation omitted); *see also id.* (“[C]laims . . . do not stand alone. Rather, they are part of a ‘fully integrated written instrument,’ consisting principally of a specification that concludes with the claims.”) (citation omitted). “Ultimately . . . the construction that stays true to the claim language and most naturally aligns with the patent’s description of the invention will be, in the end, the correct construction.” *Id.* at 1316 (internal quotation and citation omitted).

Claims should also be read in view of the prosecution history, which provides “evidence of how the PTO and the inventor understood the patent.” *Id.* at 1317. “The prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be.” *Id.*

In addition to intrinsic evidence, extrinsic evidence may be considered if necessary to explain scientific principles, technical terms, and terms of art that appear in the patent and prosecution history. *Phillips*, 415 F.3d at 1317. Extrinsic evidence consists of all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises. *Vitronics*, 90 F.3d at 1584. Extrinsic evidence in the form of

expert testimony “can be useful to a court for a variety of purposes, such as to provide background on the technology at issue, to explain how an invention works, to ensure that the court’s understanding of the technical aspects of the patent is consistent with that of a person of skill in the art, or to establish that a particular term in the patent . . . has a particular meaning in the pertinent field.” *Phillips*, 415 F.3d at 1318. While not prohibited, extrinsic evidence is less reliable than the patent and its prosecution history. *Id.* Extrinsic evidence in the form of expert testimony that is at odds with the intrinsic evidence must be disregarded. *Network Com., Inc. v. Microsoft Corp.*, 422 F.3d 1353, 1361 (Fed. Cir. 2005).

THE ASSERTED PATENTS

a. ’739 Patent

The ’739 patent is titled “Photovoltaic In Line Fuse Connector Assembly Having An Integral Fuse” and names Dean Solon as the inventor. ’739 patent, cover.⁴ The ’739 Patent issued on February 4, 2020 from an application filed on June 3, 2014, which in turn claimed priority to a provisional application, U.S. Provisional App. No. 61/830,284 filed on June 3, 2013. *Id.*

The parties identified disputed terms in claims 1, 2, 6, 10, and 15 of the ’739 patent as part of the *Markman* process. *See* Updated Joint Chart.⁵ Independent claims 1 and 10 are reproduced below, with disputed claim terms highlighted in bold:

1. An in line assembly for a solar installation including:
 - a. A photovoltaic fuse having a solid outer surface including a first end, a second end and a middle section there between, said solid outer surface defining an outline;

⁴ The ’739 patent is attached to Complainant’s claim construction brief as Ex. 1.

⁵ Claims 2, 6, and 15 are no longer asserted in this investigation. *See* Order No. 15.

- b. An ***undermold*** surrounding and sealing said fuse, said ***undermold*** defining an outer surface outline, wherein the outer surface outline of said ***undermold*** is substantially parallel relative to the outline of said solid outer surface;
- c. An overmold defining an outline and surrounding said ***undermold***, said ***undermold*** and said overmold each constructed of a single unit and each constructed of dissimilar materials, ***wherein the outline of said overmold is substantially parallel relative to the outline of said undermold***; and
- d. A first ***photovoltaic connector engaged with said first end***, wherein said assembly provides electrical insulation.

10. A photovoltaic wire harness including:

- a. A trunk wire having a plurality of branch wires extending there from in pairs, said branch wires and said trunk wire forming angles having vertices of approximately degrees; and
- b. A plurality of fuse assemblies engaged only with said branch wires in a ratio of one fuse assembly per branch wire, said fuse assemblies each including:
 - i. A photovoltaic fuse having a solid outer surface including a first end, a second end and a middle section there between, said solid outer surface defining an outline;
 - ii. An ***undermold*** surrounding and sealing said fuse, said undermold defining an outer surface outline, wherein the outer surface outline of said ***undermold*** is substantially parallel relative to the outline of said solid outer surface;
 - iii. An overmold defining an outline and surrounding said undermold, said ***undermold*** and said overmold each constructed of a single unit and each constructed of dissimilar materials, ***wherein the outline of said overmold is substantially parallel relative to the outline of said undermold***; and
 - iv. A first ***photovoltaic connector engaged with said first end***, wherein said assembly provides electrical insulation.

b. '254 Patent and '153 Patent

The '254 and '153 patents are entitled “Lead Assembly For Connecting Solar Panel Arrays to Inverter.” The patents share a common specification, *see* SB at 27, and each name the same inventor, Dean Solon. '254 patent, cover; '153 patent, cover.⁶ The '254 patent issued on April 27, 2021. The '153 patent is a continuation of the '254 patent and issued on June 27, 2023. Both patents claim priority to the same provisional application, U.S. Provisional App. No. 62/047,773, which was filed on September 9, 2014. *Id.*

The parties⁷ identified disputed terms in claim 1, 7 and 14 of the '254 patent as part of the *Markman* process. *See* Updated Joint Chart.⁸ Independent claims 1 and 7 are shown below with the disputed claim terms highlighted in bold:

1. A lead assembly for use in a solar energy installation including:
 - A. A first drop line and a second drop line, said first drop line terminating in a drop line connector;
 - B. At least one 30 amp feeder cable terminating in a feeder cable connector, said first drop line and said at least one feeder cable electrically coupled at a nexus;
 - C. A means for securing said nexus, said securing means selected from the group consisting of compression lug, soldering, splicing, crimping, and combinations thereof;
 - D. An undermold having an inner surface and an outer surface, both surfaces extending in a longitudinal direction of said at least one feeder cable, said inner surface surrounding and fully encasing said securing means, said inner surface comprised of a **first aperture** concentric with said securing means and said at least one feeder cable, **said first aperture extending continuously through said undermold** in said longitudinal direction and having a first diameter, said at least one feeder

⁶ The '254 patent is attached to Complainant's claim construction brief as Ex. 2 and the '153 patent is attached to Complainant's claim construction brief as Ex. 3. CIB Exs. 2, 3.

⁷ The '254 patent and '153 patent are only asserted against Voltage. *See, e.g.*, Amended Complaint, EDIS Doc. ID 800563 (July 19, 2023).

⁸ Claim 14 is no longer asserted. *See* Order No. 15.

cable continuously extending through said first aperture, and a *second aperture* concentric with said first drop line and *parallel to said first aperture*, said *second aperture only partially extending through said undermold* in said longitudinal direction, said *second aperture* having a second diameter smaller than said first diameter, said first drop line extending from said second aperture; and

- E. An overmold surrounding said undermold and forming an undermold-overmold interface only at said outer surface, wherein said lead assembly combines power from a plurality of solar arrays and transmits that power to an inverter in a solar energy installation lacking a combiner box between said solar arrays and said inverter, and wherein said lead assembly has a voltage rating of 1500 VDC.

7. A solar power system comprising:

- A. A first plurality of solar panels electrically coupled by a first wire harness to form a first solar array;
- B. A second plurality of solar panels electrically coupled by a second wire harness to form a second solar array;
- C. A lead assembly including a first drop line electrically connected to said first wire harness, and a 30 amp feeder cable electrically connected to a component selected from the group consisting of a trunk buss jumper, an inverter, a connection unit, a recombiner, and a disconnect unit, said first drop line and said feeder cable electrically connected at a first nexus secured by a compression lug, said compression lug surrounded by an undermold having an inner surface and an outer surface, both surfaces extending in a longitudinal direction of said feeder cable, said inner surface surrounding and fully encasing said compression lug, said inner surface comprised of a *first aperture* concentric with said compression lug and said feeder cable, said *first aperture extending continuously through said undermold* in said longitudinal direction and having a first diameter, said feeder cable extending continuously through said *first aperture*, and a *second aperture* concentric with said first drop line and *parallel to said first aperture*, said *second aperture only partially extending through said undermold* in said longitudinal direction, said *second aperture* having a second diameter smaller than said first diameter, said first drop line extending from said *second aperture*, with said undermold surrounded by an overmold and forming an undermold-overmold interface only at said outer surface, wherein said lead assembly has a voltage rating of 1500 VDC; and
- D. A second drop line electrically connected to said second wire harness, said second drop line electrically connected to said feeder cable at a

second nexus, wherein the solar power system doesn't include a combiner box upstream of said component.

The parties have identified disputed terms in claims 1, 21, 24 of the '153 patent as part of the *Markman* process. See Updated Joint Chart. Claims 1, 21, and 24 are recited below with the disputed claim terms highlighted in bold:

1. A lead assembly for use in a solar energy installation including:

a drop line terminating at a drop line connector, the drop line connector configured to connect with a central trunk of a wire harness, the central trunk of the wire harness having a plurality of branches that each are configured to electrically connect to a separate solar panel contained in an array of a plurality solar panels;

a feeder cable electrically coupled to the drop line at a *nexus*;

an undermold that fully encases the *nexus*, the undermold further comprising:

a ***first aperture extending completely through the undermold*** and having a first diameter, wherein the feeder cable extends through ***the first aperture*** along a first longitudinal axis; and

a ***second aperture extending partially through the undermold*** and having a second diameter different than the first diameter, wherein the drop line extends from ***the second aperture*** along a second longitudinal axis;

a ***third aperture extending partially through the undermold*** and having a third diameter different than the first diameter, wherein a second drop line extends from the third aperture along a third longitudinal axis; and

an overmold surrounding the undermold and forming an undermold-overmold interface at an outer surface of the undermold.

21. A solar power system comprising:

a plurality of solar panels each electrically coupled to one of a plurality of branches of a wire harness to form a first solar array;

a lead assembly comprising:

a drop line electrically connected to a central trunk of the wire harness and configured to receive power from the plurality of solar panels;

a second drop line electrically connected to a central trunk of a second wire harness and configured to receive power from a plurality of solar panels in a second solar array;

a feeder cable, the feeder cable electrically connected to the drop line and the second drop line at a nexus; and

a **primary mold** that fully encases the nexus so as to substantially seal the nexus from external environmental conditions, the **primary mold** further comprising:

a **first aperture extending completely through the primary mold** and having a first diameter, wherein the feeder cable extends through **the first aperture**;

a **second aperture extending partially through the primary mold** and having a second diameter smaller than the first diameter, wherein the drop line extends into **the second aperture** and

a **third aperture extending partially through the primary mold** and having a third diameter smaller than the first diameter, wherein the second drop line extends into **the third aperture**.

24. A solar power system comprising:

a plurality of solar panels electrically coupled by a wire harness to form a first solar array;

a lead assembly comprising:

a first drop line electrically connected to the wire harness and configured to receive power from the plurality of solar panels;

a feeder cable, the feeder cable electrically connected to the drop line at a *nexus*;

a **primary mold** that fully encases the *nexus* so as to substantially seal the *nexus* from external environmental conditions, the primary mold further comprising:

a **first aperture extending completely through the primary mold** and having a first diameter, wherein the feeder cable extends through the first aperture along a first longitudinal axis;

a **second aperture extending partially through the primary mold** and having a second diameter smaller than the first diameter, wherein the drop line extends into the **second aperture** along a second longitudinal axis; and

a second drop line electrically connected to a second wire harness that connects to a plurality of solar panels, the second drop line electrically connected to the feeder cable at the *nexus* fully encased by the *primary mold*, wherein the second drop line extends into a third *aperture* defined by the primary mold along a third axis.

III. LEVEL OF ORDINARY SKILL IN THE ART

Complainant identifies the following qualifications for a person of ordinary skill in the art: “at least a bachelor’s degree in mechanical or electrical engineering or a related scientific field and at least two years’ experience working with photovoltaic systems, and who has an understanding of electrical balance of systems (EBOS) solutions for industrial solar power installations, with recognition that more education could substitute for experience and that experience combined with training could substitute for formal education.” CIB at 4.

Respondents’ proposed qualifications for a person of ordinary skill in the art are: “at least a bachelor of science degree in electrical engineering, mechanical engineering, chemistry, materials science and engineering, or an equivalent, and two years of academic or professional experience involving electrical wiring and connectors. Lack of professional experience could be substituted by additional education, and vice versa.” RIB at 3.

Staff contends that a person of skill in the art would be: “at least a bachelor’s degree in engineering or a related scientific field with at least one year of studying or working with (which could include designing) electrical wiring and associated fuses, connectors, and moldings. Additional work or research experience can substitute for less or different education and professional experience, and vice versa.” SB at 6.

The parties' proposals for the level of ordinary skill in the art are substantially similar⁹ and the parties have not identified any meaningful dispute regarding the level of ordinary skill in the art. SB at 6; Tr. (Resp. counsel) 239:2-8; Tr. (Compl. counsel) at 239:2-7, 9. Upon consideration of the parties' proposals, at this time the undersigned adopts the following level of ordinary skill in the art: A person of ordinary skill in the art would have had at least a bachelor's degree in mechanical or electrical engineering or a related scientific field and at least two years experience working with photovoltaic systems and electrical wiring, with recognition that more education could substitute for experience and that experience combined with training could substitute for formal education.

IV. DISPUTED CONSTRUCTIONS

As reflected in the Updated Joint Chart, the parties dispute the construction of eight terms in the *Markman* process: (1) "undermold" ('739 patent); (2) "the outline of said overmold" ('739 patent);¹⁰ (3) "photovoltaic connector engaged with said [first/second] end" ('739 patent); (4) "primary mold" ('153 patent); (5) "aperture" ('254 and '153 patents); (6) "second aperture . . . parallel to said first aperture" ('254 patent); (7) "second aperture only partially extending through said undermold" and related terms ('254 and '153 patents); and (8) "said first aperture extending [completely/continuously] through [said/the] [undermold/primary mold]" ('254 and '153 patents). Updated Joint Chart at 2-6.

⁹ Staff notes that the "minor differences" in formulations of the definition of a person of skill in the art "should not impact the claim construction process." SB at 6.

¹⁰ The Updated Joint Chart includes the full text of the claim limitation—"wherein *the outline of said overmold* is substantially parallel relative to the outline of said undermold," but notes that the "claim construction dispute at issue relates specifically to the 'the outline of said overmold' and not other portions of the phrase." See Updated Joint Chart at 2 n.1.

a. “undermold” (’739 patent, claims 1 & 10)

Claim Language	Complainant	Respondents	Staff
“undermold”	Plain and ordinary meaning, such as “material molded over a piece or part that acts to seal against environmental factors”	“innermost mold” ¹¹	“shape of material molded over a piece or part that acts as the primary mold to seal against environmental factors” Alternatively, “innermost mold” (see “undermold” and “primary mold” in ’254/’153 Patents)

The parties dispute the claim element “undermold” as it appears in the ’739 patent. The primary dispute between the parties is whether an undermold must be the “innermost” mold—that is, the “mold” or layer closest to the fuse—or whether there may be a mold or layer between an “undermold” and the fuse. *See* Tr. (Resp. counsel) at 22:16-19 (“And it seems to us, and it seems that we’re in agreement with Shoals, that our revised innermost mold construction lends us to the question, the primary question, which is is undermold the innermost mold.”). For example, in an embodiment in which a fuse is surrounded by three layers of molding, the parties dispute whether the claimed “undermold” is the mold closest to the fuse, or whether the claimed “undermold” could be the middle mold. *See* Tr. (Compl. counsel) at 12:4-10 (“[ALJ Bhattacharyya]: Can you tell me when the distinction between your construction and Respondents’ construction comes into play? Is it only if there are more than two potential molds and you want to assert that the middle one is the undermold, or can you just sort of describe to

¹¹ Respondents revised their construction after briefing and before the *Markman* hearing. *See* Resp. Slides at 17; Tr. (Resp. counsel) at 22:11-15. Respondents’ initial construction was “innermost mold shaped or formed directly over an already existing piece or part, and over which an overmold is shaped or formed.” Joint Chart at 3.

me what the substantive dispute is? [Ms. Trinh]: That is correct.”); Tr. (Resp. counsel) at 26:23-27:3 (“[ALJ Bhattacharyya]: So as I understand the dispute, Complainant isn’t really disputing that an undermold is under an overmold, but its more whether there can be another mold under the undermold. Is that your understanding of the dispute? [Ms. James]: Yes.”).

Complainant contends that the plain and ordinary meaning of “undermold” is “material molded over a piece or part that acts to seal against environmental factors.” CIB at 9. Complainant asserts that Respondents’ and Staff’s proposed constructions add limitations that are not required by the asserted claims or supported by the intrinsic evidence. CRB at 1. The disputed claim language uses the transitional phrase “including” an “undermold” and an “overmold,” which Complainant posits means that additional elements—*e.g.*, an additional mold—may be added. Tr. (Compl. counsel) at 11:3-7. The only basis for the proposal that the “undermold” be the “innermost” mold, Complainant contends, is the improper importation of limitations from certain exemplary embodiments in the specification. CRB at 2; Tr. (Compl. counsel) at 11:10-12. Complainant also objects to Staff’s proposal’s inclusion of the requirement that the “undermold” be the “primary mold” and that the undermold be the “shape of” material molded over a piece of part. CIB at 8. As to the “primary” requirement, Complainant argues that the concept of a “primary” mold is undefined by Staff and “unnecessarily complicates” the claim construction. Tr. (Compl. counsel) at 11:22-23; CIB at 8. As to “shape of,” Complainant asserts that the undermold “may be any shape.” CIB at 8.

At the *Markman* hearing, Respondents asserted a revised construction, asserting that “undermold” should be construed as “innermost mold.” Tr. (Resp. counsel) at 22:11-19. Respondents contend that the claim language, specification, and prosecution history do not contemplate any embodiments where there is an intervening layer or mold between the

“undermold” and the “fuse.” Tr. (Resp. counsel) at 28:16-17 (“There’s no example of a mold under the undermold in the provisional application.”); *id.* at 28:19-20 (“And there’s no example of a mold under an undermold in the patent.”). In the instance in which there are more than two molds or layers—a possibility Respondents stated at the *Markman* hearing is within the scope of the claim¹²—Respondents contend that the innermost layer is the undermold. Tr. (Resp. counsel) at 29:2-8 (agreeing that “triple molded scenario” is not excluded), 27:17-21 (discussing Shoal’s hypothetical three-layer embodiment, stating “[w]e’re not trying to read that out of the claim. There can be a third layer.”). Although Respondents do not dispute that the “undermold” must seal the fuse against environmental factors, RIB at 8 n.2, Respondents argue that the inclusion is redundant, as that requirement is separately recited in other limitations of the independent claims. RRB at 2; *see* ’739 patent, cl. 1 (“an undermold surrounding and *sealing* said fuse” (emphasis added)). Respondents further object to Complainant’s construction because it does not distinguish the “undermold” from the “overmold” or a “mold” generally. Tr. (Resp. counsel) at 29:21-25 (“Shoals, in its construction or lack thereof of a construction, does not attribute any meaning to the word ‘under.’ Their construction just says mold, and they are not explaining to the Court how undermold, overmold, relate to each other and are distinct from each other.”); RIB at 12. Respondents also “disagree in form” with the inclusion of “primary mold” in Staff’s proposed construction, as “[p]rimary mold” is not a term used in the ’739 patent.” RIB at 8.

Staff’s primary proposed construction for “undermold” is “shape of material molded over a piece or part that acts as the primary mold to seal against environmental factors.” SB at 8.

¹² Respondents’ position at the *Markman* hearing appears to be different than the position taken in its briefing with respect to three (or more) layer embodiments. *See, e.g.*, RRB at 1 (“The ’739 patent only ever describes two molds and otherwise lacks any written description for a POSITA to understand that the inventor possessed an embodiment with a mold beyond a single undermold and overmold.”).

Staff contends that the “shape of” aspect of the proposed construction is necessary because in the context of the claims and later limitations reciting the “outline” of the undermold and outermold, the “specific shape of the overmold” is important. Tr. (Staff) at 32:23-33:2. Staff explains that the ’739 patent implies that it is the undermold with the “primary” function of sealing the fuse from environmental factors. Tr. (Staff) at 42:9-11 (“It doesn’t say primary seal, Your Honor, but that’s where primary – that’s what it implies.”). In the alternative, Staff agrees that Respondents’ proposed construction of “innermost mold” is “technically accurate.” Tr. (Staff) at 33:9-12.¹³ Staff explains that Complainant’s construction would permit “potentially two undermolds” but that the claims only envision a single undermold. Tr. (Staff) at 36:2-7. In Staff’s view, any additional molds—beyond the innermost mold—would be overmolds. Tr. (Staff) at 37:10-11 (“It will be a first overmold or a second overmold, or whatever.”). Staff noted a potential distinction between a “mold” and an “insulative layer.” Tr. (Staff) at 37:11-16 (“There is a question, if this first layer surrounding the fuse is not actually a mold but a layer, more just an insulative layer, then that’s a technical question, but then in that case the second or the dark green layer, as long as it’s a mold, would be the innermost mold.”) (referencing Resp. Slides at 29)).

Responding to Respondents’ and Staff’s arguments at the *Markman* hearing, Complainant renewed their argument that nothing in the claims, specification, or prosecution history limits the invention to double-layer molds or limits the “undermold” to only the “innermost” mold. Tr. (Compl. counsel) at 40:2-5, 6-15. Complainant also contended that neither the claims nor specification required the “undermold” to be the “primary” seal against

¹³ Staff also explained that in Staff’s view, Complainant’s construction is “adequate” but “a little bit too broad.” Tr. (Staff) at 32:14-22.

environmental factors. Tr. (Compl. counsel) at 40:16-20. Complainant also explained that there was no need to distinguish the undermold from the overmold in the construction of “undermold” because, when read in the context of the claims, separate positional limitations differentiate between the “undermold” and the “overmold.” Tr. (Compl. counsel) at 41:12-16 (“[T]he claim provides that the overmold surrounds the undermold. So the plain and ordinary meaning of undermold would suggest that it is under the overmold. So it doesn’t seem that that needs to be included in the claim to distinguish between the undermold and the overmold.”); CRB at 2-3.

Upon consideration of the parties’ arguments and the intrinsic record, the undersigned construes the term “undermold” to mean “material molded over a piece or part that seals¹⁴ against environmental factors and is surrounded by the overmold.” The undermold may be—but need not be—the “innermost mold.”

First, there is no dispute that the undermold should “seal[] against environmental factors.” See ‘753 patent, cls. 1, 10 (requiring undermold “sealing said fuse”); RIB at 8 n.2; CIB at 9; SB at 8. Further, the contextual claim language also gives meaning to the inclusion of “under,” as the asserted claims require an overmold “surrounding said undermold.” ‘739 patent, cl. 1, 10. See *Phillips*, 415 F.3d at 1314 (“the claims themselves provide substantial guidance as to the meaning of particular claim terms”).¹⁵ There is also no dispute that the undermold is “material molded over a piece or part.” See CIB at 6-7; RIB at 7; SB at 8.

¹⁴ While Complainant’s proposed construction uses the language “acts to seal” rather than “seals,” the undersigned adopts language that more directly tracks the claim.

¹⁵ Although the claims already require an “overmold surrounding the undermold,” including this language in the claim construction clarifies the meaning of “*under*mold.” This is consistent with Respondents’ original *Markman* briefing, which faulted Complainant’s construction for not giving meaning to the term “under” and proposed that the construction of “undermold” include the language “over which an overmold is shaped or formed.” See RIB at 7-12; see also Tr. (Resp. counsel) at 29:21-30:2 (arguing that Shoals’s construction does not provide meaning to “under”).

The dispute, as discussed above, is whether in an embodiment with three or more layers or molds, there can be only a single “undermold,” which is the “innermost mold.” The claims, specification, and prosecution history do not support construing “undermold” as the “innermost mold.”

Beginning with the claim language, the claims are written with the transitional phrase “including,” and require both an “undermold” and an “overmold.” See ’739 patent, cl. 1 (“An in line assembly for a solar installation **including**” (emphasis added)). “[W]hen open-ended terms like ‘including’ or ‘comprising’ introduce a claim element(s), ‘other elements may be added’ to the claimed element(s) and the resulting structure might still read on the claim at issue.” *Liberty Ammunition, Inc. v. United States*, 835 F.3d 1388, 1400 (Fed. Cir. 2016) (quoting *Lucent Technologies, Inc. v. Gateway, Inc.*, 525 F.3d 1200, 1214 (Fed. Cir. 2008)). The claim language itself, then, does not limit the invention to a single “undermold.” Nor does the claim language specify that an “undermold” is the “innermost” layer or mold.

The specification similarly does not limit the invention to a single “undermold” or require that an “undermold” be the “innermost” layer or mold. The specification discloses “exemplary embodiments,” including the “exemplary assembly” depicted in Figures 5-8, which are described as depicting the fuses in a “late stage of production including undermolding 50, which seals the assembly.” See, e.g., ’739 patent, 2:39-40, 2:64-65, 3:13-15, Fig. 8. An overmold 60 is depicted in Fig. 5, which is the finished assembly, and provides “a secondary seal for the fuse.” *Id.* at 3:17-20, Fig. 5. Another “exemplary assembly” is depicted in Figs. 9-12, including the depiction of “undermolding 50” in Fig. 12, and overmold 60 in Fig. 9. The figures and accompanying descriptions are expressly identified as “exemplary,” and do not support Staff’s or Respondents’ proposal to limit the claimed “undermold” to the “innermost” mold or layer. See, e.g., *Phillips*,

415 F.3d at 1323 (“[A]lthough the specification often describes very specific embodiments of the invention, we have repeatedly warned against confining the claims to those embodiments.”); *Maalouf v. Microsoft Corp.*, No. 2022-1164, 2023 WL 2182284, at *3 (Fed. Cir. Feb. 23, 2023) (holding “[t]he Board properly declined to import a portion of an exemplary embodiment from the specification into the claim”).¹⁶

Finally, the prosecution history does not support limiting the claimed “undermold” to the “innermost mold.” Respondents point to statements made in prosecution by the Examiner and the Applicant as to the process of overmolding:

Overmolding is a process where a single part is created using two or more different materials in combination. Typically the first material, sometimes referred to as the substrate, is partially or fully covered by subsequent materials (overmold materials) during the manufacturing process.

RIB Ex. 3 at SHOALS00000511 (applicant-provided definition); *see also id.* at

SHOALS00000518 (Examiner-provided definition of overmolding as “overmolding is the process of adding an additional layer of material over an already existing piece or part”). These definitions, however, do not describe an “undermold” or otherwise limit the undermold to the first or innermost mold. These definitions are consistent with the remaining context of the claims, which require that an overmold “surround[]” the undermold. ’739 patent, cl. 1.

¹⁶ Respondents also point to the specification’s use of the term “double-molded” for support of their contention that the “undermold” must be the innermost layer. *See, e.g.*, Tr. (Resp. counsel) at 25:17-23 (citing to the use of “double-molded” in the Abstract and Summary of Invention); ’739 patent, Abstract (“A photovoltaic in line connector assembly has an integral fuse, and is double molded to provide electrical insulation, protection and strain relief.”), 1:53-54 (“The assembly is double molded to provide electrical insulation, protection and strain relief.”); RRB at 1-2. Respondents agreed at the hearing, however, that the ’739 patent is not limited to double-molded or two mold embodiments. Tr. (Resp. counsel) at 28:23-29:4 (agreeing that “triple molded scenario” is not excluded); *id.* at 27:19-21 (“There can be a third layer.”).

Moreover, if anything, this definition suggests that multiple layers can be “overmolds,” thus making it unclear why multiple layers could not also be “undermolds.”¹⁷

The undersigned also declines to adopt Staff’s proposed limitation of “primary mold to seal against environmental factors.” It appears that “primary mold” is intended in Staff’s construction to convey the same meaning as “innermost mold.” *See, e.g.*, SB at 11 (advocating construction including “primary [*i.e.* innermost] mold” (brackets in original)). The claim language, specification, and prosecution history do not support such a limitation for the same reasons as discussed above. In addition, Staff references the specification’s description of a “secondary seal” (provided by an “overmold”) to support its proposal. *See* SB at 10; Tr. (Staff) at 33:3-8; ’739 patent, 3:17-20. Without more, this language, describing an exemplary embodiment (*see* ’739 patent, 2:38-40), is insufficient to read into the term “undermold” a requirement that it is the “primary mold to seal” or “innermost mold.”¹⁸ The claims themselves already require that the undermold must “seal” the fuse. *See* ’739 patent, cls. 1, 10.

Accordingly, “undermold” is construed to mean “material molded over a piece or part that seals against environmental factors and is surrounded by the overmold.”

¹⁷ As argued by Staff, undermolds and overmolds are not necessarily mutually exclusive categories. *See* Tr. (Staff) at 34:18 (“an undermold is sort of an overmold as well”).

¹⁸ Staff’s proposal to require that the undermold is the “*shape of* material molded over a piece or part,” SB at 8, has not been shown to be relevant to resolving the identified dispute between the parties, at least at this point in the investigation. *Vivid Techs., Inc. v. Am. Science & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (“[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.”).

b. “outline of said overmold” (’739 patent, claims 1 & 10)

Claim Language	Complainant	Respondents	Staff
“wherein <i>the outline of said overmold</i> is substantially parallel relative to the outline of said undermold”	No construction necessary; Plain and ordinary meaning, such as “wherein the outer surface outline of said overmold is substantially parallel relative to the outer surface outline of said undermold”	Indefinite under § 112	Indefinite under § 112 “wherein the three-dimensional outline of the inner and outer surfaces of the overmold is substantially parallel to the three-dimensional outline of the outer surface of the undermold”

The parties dispute the meaning of “outline of said overmold.” Respondents argue that the term is indefinite because it is unclear whether this term refers to the “outer surface” outline, the “inner surface outline,” or both; and it is also unclear whether the “outline” refers to the two-dimensional or three-dimensional outline. *See* RIB at 13. Respondents argue that the prosecution history, during which the Examiner stated that an undermold could have both an “inner surface outline” and an “outer surface outline,” indicates that the term “outline of said overmold” (which does not specify whether it is an “inner” or an “outer” surface) is indefinite. Respondents argue that Shoals’ briefing introduces additional indefiniteness concerns. *See* RRB at 5. Respondents also argue that Shoals’ “outline” of the molding depicted in the Stepniak reference was unclear as to whether it the outer surface outline included certain portions of the identified outline. *See* RRB at 7.

Staff also contends this term is indefinite for reasons similar to Respondents. *See* SB at 12-14. Staff also provides an alternative proposed construction, though states that the alternative proposal “does not resolve the problems” it identified elsewhere. *See* SB at 20.

Complainant argues that the plain and ordinary meaning should apply, and that it is clear from the context of the claim and the prosecution history that the term “outline of said overmold” refers to the “outer surface outline” of said overmold. *See* CIB at 9-15; CRB at 3-5.

Complainant contends that the “outer surface outline” is consistent with the dictionary definition of “outline.” *See* CIB at 13.

Upon consideration of the parties’ arguments and the intrinsic record, the undersigned finds that Respondents and Staff have not established by clear and convincing evidence that the term “outline of said overmold” is indefinite based on any ambiguity as to whether this term refers to the outline of the “outer surface” or “inner surface” of the claimed overmold. A claim term may be indefinite if, viewed in the light of the specification and the prosecution history, it fails to “inform those skilled in the art about the scope of the invention with reasonable certainty.” *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014). Indefiniteness, like all invalidity defenses, must be established by clear and convincing evidence. *See, e.g., Halliburton Energy Servs., Inc. v. M-I LLC*, 514 F.3d 1244, 1249-50 (Fed. Cir. 2008). The undersigned is persuaded by Complainant’s arguments that the relevant comparison required by this claim language is to the outer surface of the undermold. *See* CRB at 4-7 (discussing prosecution history); RIB Ex. 3 at SHOALS00000605-606 ((Feb. 6, 2018 Response) (arguing that the “profile of said overmold is similarly shaped and oriented relative to the profile of said undermold” by reference to the outer surface of the overmold); *id.* at SHOALS00000659 (June 19, 2018 Response) (“[p]reviously pending claims erroneously recited ‘outline’ and ‘profile’ and used these terms interchangeably. This is corrected in the Listing of Claims.”); *see also id.* at SHOALS00000657-58 (comparing “outline” of undermold and fuse through showing outlines of outer surfaces). Respondents and Staff have not shown clear and convincing evidence to the

contrary. That applicant amended the claims to state that the “outline of the inner mold” is the “outer surface outline” of the inner mold, in response to the Examiner’s statement that the inner mold has both an outer and an inner surface, does not transform this term into an indefinite claim term given the other evidence of record.

The issue of whether the “outline of said overmold” should be viewed as a three-dimensional outline or two-dimensional outline (or some other/hybrid approach) is deferred.¹⁹ This issue is closely intertwined with the meaning of “substantially parallel” which the parties have deferred in view of expert testimony, and the undersigned finds that it would be advisable to consider the claim term in context. *See* Joint Updated Chart at n.1; SB at 16 n.16; *Cox Comm’ns, Inc. v. Sprint Comm. Co. LP*, 838 F.3d 1224, 1231-32 (while “the common practice of training questions of indefiniteness on individual claim terms is a helpful tool,” indefiniteness ultimately turns on whether the “*claims* . . . fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention”).

c. “photovoltaic connector engaged with said [first/second] end” (’739 patent, claims 1 & 10)

Claim Language	Complainant	Respondents	Staff
“photovoltaic connector engaged with said [first/second] end”	Plain and ordinary meaning, such as “photovoltaic connector electrically connected with said [first/second] end”	Plain and ordinary meaning, such as photovoltaic connector fit together with the corresponding said [first/second] end”	

Claims 1 and 10 of the ’739 patent recite the limitation “a first photovoltaic connector engaged with said first end,” and claim 2, relatedly, recites “a second photovoltaic connector engaged with said second end.” ’739 patent, cl. 2; *see also id.* cl. 11 (claiming that “said fuse

¹⁹ Also deferred is whether the claim may be indefinite depending on this issue, or based on any other issues relating to the “substantially parallel” determination or other aspects of this claim term.

assemblies each further include a second photovoltaic connector”). The antecedent basis for “said first end” and “said second end” are found in other limitations, which recite “a photovoltaic fuse having a solid outer surface including a first end, a second end, and a middle section there between.” *Id.* The parties dispute whether the end of the fuse and the photovoltaic connector must be “engaged” via a physical or mechanical connection, or whether an electrical connection—such as connection via wire—is sufficient. Respondents and Staff contend that “engaged with” requires “a physical relationship whereby the fuse is ‘fit together with’” the connectors. RIB at 16; SB at 21. Complainant contends that no direct physical connection between the fuse and the photovoltaic connector is required; rather, to be “engaged,” an electrical connection is all that is required. CIB at 15.

Complainant asserts that the figures in the ’739 patent depict the fuses electrically connected to photovoltaic connectors via jumper wires, indicating that the “engaged with” connection is concerned with electrical connection. CIB at 16-17 (citing ’739 patent, Figs. 5, 6, 9, 10). There is no limit to the length of the jumper wires, Complainant asserts, and Figure 16 depicts an exemplary in-line assembly where the fuse is connected via wires to a downstream photovoltaic connector. CIB at 18 (citing ’739 patent, Fig. 16, 3:6-9). Complainant also contends that during prosecution, the Examiner understood that “engaged with” encompassed electrical connection, as the Examiner found that a prior art reference, Jonczyk, taught a fuse and connector “electrically ‘engaged.’” CIB at 19 (citing RIB Ex. 3²⁰ at SHOALS00000573); *see also* CRB at 11-14 (discussing prosecution history). Moreover, Complainant points to variations of “engaged” in other claims of the ’739 patent that Complainant contends describe both direct

²⁰ Complainant’s brief cites to their Ex. 1, which is an excerpt of the prosecution history of ’739 patent. For ease of reference, the undersigned cites to the same portions of the prosecution history in Respondents’ Ex. 3, which is the entirety of the prosecution history of the ’739 patent.

and indirect electrical connections, for example, “fuse assemblies *engaged only with* said branch wires” and “wherein the step of *engaging* each terminal brand with one solar panel includes the step of connecting to said first photovoltaic connector.” CIB at 20 (emphasis original) (citing ’739 patent, cls. 10, 15, 16). Finally, according to Complainant, at least one district court has found that “engage” does not require a direct physical connection. CIB at 20-21 (citing *Fastek, LLC v. Steco*, No. 10 CV 0972 MMA CAB, 2011 WL 1304606, at *3–5 (S.D. Cal. Apr. 6, 2011)).

Respondents contend that the ’739 patent “consistently adheres to a nomenclature that distinguishes” between electrical connection and physical or mechanical connection. In the specification, Respondents assert, electrical connections—such as that between the fuses and the jumper wires depicted in Figure 10—are described using the word “connected.” RIB at 17 (citing ’739 patent, Fig. 10, 3:26-28 (“fuse 15 connected to first the PV cable 25 and second to the jumper wire 20, with the jumper wire connected to connector socket 45”)). The fuse-connector interface, Respondents contend, is described using the terms “integrated into.” RIB at 18 (citing ’739 patent, 1:50-53). As to the Figure 16 embodiment, Respondents contend that the embodiment is unclaimed as a result of a species election during prosecution, RIB at 18 n.7; RRB at 9, and, moreover, that the embodiment is described as “without connectors,” rather than as an embodiment with connectors “engaged with” the fuse. RIB at 18 (citing ’739 patent, 2:31-33, 4:18-14). Respondents further argue that the specification identifies embodiments where the connector is not directly and physically fit together with the fuse as “a wire end” or “without a connector,” illustrating that remote connectors—*e.g.*, those connected only via a wire—are not within the scope of the claims. RIB at 19. Respondents further contend that during prosecution, the applicant proposed amendments that were consistent with a physical or mechanical

understanding of “engaged with.” RIB at 19-20. Relying on dictionary definitions, Respondents contend that their proposed construction of “fit together” is consistent with dictionary definitions of “engage.” RIB at 20 (citing RIB Ex. 4 (Cambridge Dictionary)).

Staff contends that the alleged invention of the ’739 patent “is directed to the mechanical aspects” of the photovoltaic fuses, rather than the electrical aspects, and thus, the meaning of “engaged with” should be viewed as focused on the “non-conductive” components. SB at 22-23. Staff also points to portions of the prosecution history as supporting the proposed construction of “engaged with” as “fit together.” SB at 23-24. Staff, like Respondents, also argues that Figure 16 shows a “zero connector” embodiment that is unclaimed. SB at 25-26.

At the *Markman* hearing, the parties each argued that Figure 16 and the prosecution history supported their proposed construction. Complainant argued that the species restriction requirement was withdrawn in the Notice of Allowance, and that such a withdrawal is effectively as though no restriction requirement was ever made. Tr. (Compl. counsel) at 103:1-12 (citing *In re Ziegler*, 443 F.2d 1211, 1215 (CCPA 1971)); Compl. Slides at 42. Thus, Complainant argued, construing the term to require a physical connection would exclude the disclosed—and claimed—embodiment in Fig. 16. Tr. (Compl. counsel) at 104:2-7, 127:5-17; Compl. Slides at 45 (citing *MBO Labs., Inc. v. Becton, Dickinson & Co.*, 474 F.3d 1323, 1333 (Fed. Cir. 2007)). Respondents, however, argued that withdrawal of the restriction requirement did not “claw back” the “zero connector” embodiment in Figure 16 because (1) the applicant had already amended the claims to recite a connector “engaged with” the fuse, Tr. (Resp. counsel) at 110:22-111:2; and (2) the restriction requirement between the product and method claims was withdrawn, but the species election was not withdrawn. Tr. (Resp. counsel) at 110:19-24. Respondents explained that because no generic claim ever issued—that is, no claim that encompassed a “zero

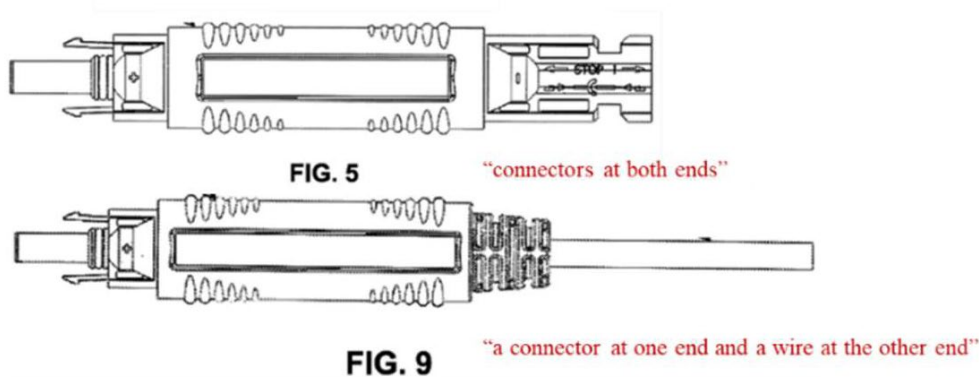
connector” embodiment—the species election remained in place. Tr. (Resp. counsel) at 128:21-129:3 (“So Shoals is right that, if a generic claim had been allowed, zero, 1 or 2 connector embodiments, they would have been entitled to everything, but that’s not what happened. . . . The claim that was allowed in some sense was generic between 1 and 2 connectors but it wasn’t generic between 2, 1, and zero connectors.”). Respondents also argued that even if Figure 16 was within the scope of the ’739 patent, the completed “assembly” itself (element 10) did not include a connector; rather, the connector was located in the wiring harness, rather than the fuse assembly. Tr. (Resp. counsel) at 130:20-131:13. Complainant, in response, contended that the connector was nonetheless “engaged with” element 10 as required by the claims. Tr. (Compl. counsel) at 131:20-23.

Upon consideration of the parties’ arguments and the intrinsic record, including the prosecution history, the undersigned construes the term “photovoltaic connector engaged with said [first/second] end” to mean a “photovoltaic connector physically or mechanically connected with said [first/second] end.” The specification and prosecution history require a direct physical or mechanical connection, not merely an electrical connection via wire, between the claimed photovoltaic connector and the claimed fuse end.

The context of the claims shows that the claimed photovoltaic connector is “include[ed] as part of an “in line assembly” (claim 1) or a “fuse assembl[y]” (claim 10). *See* ’739 patent, cl. 1 (claiming “[a]n *in line assembly* . . . *including* . . . [a] photovoltaic fuse having a solid outer surface including a first end. . . and [a] *first photovoltaic connector engaged with said first end*, wherein said assembly provides electrical insulation”); *id.* cl. 10 (claiming “[a] plurality of fuse assemblies . . . *said fuse assemblies each including* . . . [a] photovoltaic fuse having a solid outer

surface including a first end and *[a] first photovoltaic connector engaged with said first end*, wherein said assembly provides electrical insulation”) (emphases added).

In this context, the patent specification strongly supports construing “photovoltaic connector engaged with said [first/second] end” to require a direct physical or mechanical connection between the claimed fuse end and the claimed connector. *See generally Phillips*, 415 F.3d at 1314 (specification is “the single best guide to the meaning of a disputed term”). While the specification does not specifically use the term “engaged with,” it repeatedly distinguishes between assemblies “including” or “having” one or two connectors and assemblies that do not. As to assemblies including connectors, Figure 5 depicts an “exemplary assembly” described as “having connectors at both ends” and as “includ[ing] female connector 40 at the first end, and male connector 30 at the second end.” ’739 patent, 2:8-9, 64-66. Figure 9 depicts an “exemplary assembly” described as “having a connector at one end and a wire at the other end” and as “includ[ing] female connector 40 at the first end, and PV cable 25 at the second end.” ’739 patent, 2:16-17, 3:21-23.



RIB at 16 (annotated Figs. 5 and 9 from the ’739 patent). Both of these figures depict connectors with direct physical or mechanical connections to the fuse outer surface, in contrast to only a wire. *See* ’739 patent, Figs. 5-8 and 2:45-57 (showing female connector 40 and male connector

30 in relation to fuse 15 and assembly 10); Figs. 9-12 and 2:45-57 (showing female connector 40 in relation to fuse 15 and assembly 10). Consistent with this requirement, the specification states that “the fuse is preferably integrated into the connector with a wire to the connector pin or in the harness, with the fuse connected wire to wire” and “the assembly is double molded to provide electrical insulation, protection and strain relief.” *Id.* at 1:50-54.²¹

In contrast, the specification describes fuse assemblies with only wire ends as not including connectors at all. For example, the Abstract states that “[t]he assembly may include **zero**, one or two **connectors**” and the specification, in relation to Figs. 14-16, describes *inter alia* a wire harness with a “fuse . . . attached to two wires and overmolded **without the connectors.**” ’739 patent, Abstract, 4:9-11 (emphasis added). Consistent with this description, the specification explains that “Fig. 16 represents modification of a wire harness by an embodiment of the present invention that has wire at both ends.” *Id.* at 2:31-33. Figures 14 and 15, on the other hand, depict assemblies with “a male connector end and a female connector end” (Fig. 14) or “a wire end and a connector end” (Fig. 15). *See id.* at 2:25-30, 2:45-48 (defining part 10 as “Assembly”); Figs. 14-16 (each providing blow-up diagrams of assembly 10).

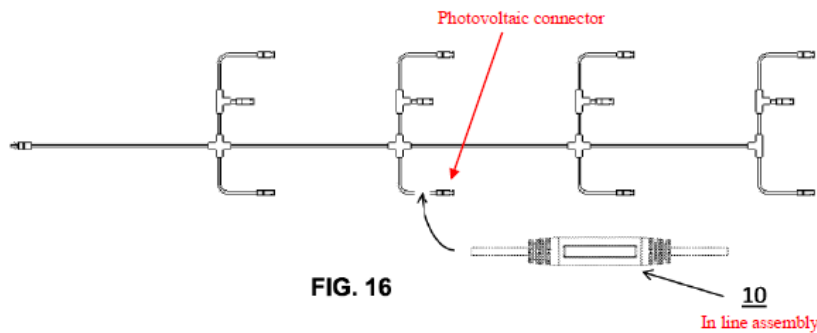
Similarly, assemblies without a connector are described in the specification and in the claim language as having a wire end, while assemblies with connectors are described as having a connector at the end. *See, e.g.,* ’739 patent, 2:16-17 (“Fig. 9 depicts an embodiment of the present invention having a connector at one end and a wire at the other end.”); cl. 12 (“wherein

²¹ Complainant’s arguments that the specification’s discussion of “jumper wires” supports their construction is unpersuasive. CIB at 16-17. While jumper wire may be present in fuse assemblies with connector ends, the evidence fails to show that wire is sufficient to form an assembly with a connector. For example, Fig. 6 (relied upon by Complainant) shows an “initial stage of production” (’739 patent, 3:1-3) and shows only connector “sockets” and “pins,” whereas the final stage of production, Fig. 5, is the figure depicting “an embodiment of the present invention having connectors at both ends.” *See id.* at 2:8-11; *see also id.* at 2:45-57 (elements 30 and 40 are the “connectors”).

said fuse assemblies each include a pair selected from the group consisting of one male type said first photovoltaic connector and one female type connector; one female type said first photovoltaic connector and one male type connector; one male type said first photovoltaic connector and one wire; and one female type said first photovoltaic connector and one wire”); 2:57-66 (the “exemplary assembly 10” of Fig. 5 “includes female connector 40 at the first end, and male connector 30 at the second end”); 3:21-23 (“Another exemplary assembly 10 is depicted in Fig. 9 which includes female connector 40 at the first end, and PV cable 25 at the second end.”); 3:40-41 (referring to “[t]he preferred connector for use in an embodiment having a male connector on one end and wires in the other end”). The specification does not describe an embodiment with a “wire end” electrically connected to a downline connector as an assembly having a connector at that end. Rather, assemblies including connectors are exclusively described and depicted as those with physically or mechanically connected connectors and are contrasted with assemblies having wire ends. This intrinsic evidence strongly indicates that the claimed assemblies do not include connectors linked to the fuse outer surface simply by a wire.²²

Complainant relies on the embodiment in Figure 16, which it asserts depicts “an exemplary in-line assembly 10 connected via wires to the photovoltaic connector downstream.”

²² The extrinsic evidence of dictionary definitions pointed to by Respondents and Staff is also consistent with a requirement for a direct physical or mechanical connection. *See* RIB at 20 (citing RIB Ex. 4 (Cambridge Dictionary)); RIB Ex. 4 (“engage” defined as “cause something to fit into and move together”).



CIB at 18-19 (annotated Fig. 16 from the '739 patent). However, as discussed *supra*, the “assembly” 10 of Figure 16 is depicted as having no connectors but rather having “wire at both ends,” and Complainant’s diagram shows the “Photovoltaic connector” outside the “assembly 10.” *Compare* '739 patent, cl. 1 *with id.* at 2:31-33 and Fig. 16.²³ Similarly, the specification describes the wire harness embodiments in Figures 14-16 as permitting a scenario where the fuse is “attached to two wires and overmolded ***without the connectors.***” *Id.* at 4:10-11 (emphasis added). Accordingly, Figure 16 does not support Complainant’s contention that assemblies with a connector linked to the fuse outer surface via a wire alone is within the scope of the claims.

Complainant further contends that the claims should be construed to include the two-wire assembly shown in Figure 16 because there would otherwise be an unclaimed embodiment and argues that its species election during prosecution (potentially disclaiming Figure 16) was withdrawn. *See* Tr. (Compl. counsel) at 103:1-25; RIB Ex. 3.²⁴ However, the unelected species

²³ The specification distinguishes between an “assembly” and the “wiring harness.” *See* Abstract (“[t]he assembly can be integrated with, or added to, a wiring harness”). Thus, the fact that the wiring harness of Figure 16 may include connectors does not mean that the fuse assemblies do.

²⁴ During prosecution, the Examiner issued a restriction requirement relating to product application claims 1-14 (“drawn to an in line assembly . . . and a photovoltaic wire harness” per the Examiner) and process application claims 15-18 (“drawn to a method of configuring a solar installation”). Ex. 3 at SHOALS00000466. The Examiner simultaneously issued an “Election of Species” requirement as between “Species 1 directed to an inline fuse and its structure (figs. 5-12)” which was “directed to

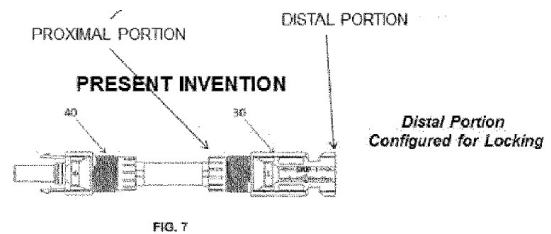
claims (claims 10-14) issued only upon amendment of the claims to include the same limitations as the elected species—*inter alia* “said fuse assemblies each includ[ing] . . . a first photovoltaic connector engaged with said first end.” *Id.* at SHOALS00000838-40. This is a species that the Examiner had identified as corresponding to Figures 5-12. *Id.* at SHOALS00000443, SHOALS00000469; discussion *supra*. Thus, regardless of whether the species election was withdrawn or not, the prosecution history is consistent with viewing the claimed connector assemblies in light of embodiments in Figures 5-12.²⁵ And even if this were not the case, in view of the clear guidance provided by the specification and claims, the issued claims do not encompass embodiments with two-wire ends. *Cf. TIP Sys., LLC v. Phillips & Brooks/Gladwin, Inc.*, 529 F.3d 1364, 1373 (Fed. Cir. 2008) (citations omitted) (declining “to construe the claim term to encompass the alternative embodiment” because such a construction “would contradict

[application] claim 1-9”; and “Species 2 directed to a wiring harness having a specific layout (figs. 13-16)” which was “directed to [application] claims 10-14.” *Id.* at SHOALS00000469. Applicant elected Invention 1 – Claims 1-14” and further elected “Species 1 directed to an in line fuse and its structure (Claims 1-9, Figures 5-12).” *Id.* at SHOALS00000475. In the Notice of Allowance, the Examiner stated that “[t]he restriction requirement” had been “reconsidered in view of the allowability of claims to the elected invention” and withdrew the restriction requirement “as to any claim that requires all the limitations of an allowable claim.” *Id.* at SHOALS00000837. By Examiner’s amendment, the Examiner allowed application claims 10-14 and 15-18 after inserting amendments that included the requirements of application claim 1. *See id.* at SHOALS00000837-841, 848-851. The claims as issued and the application claims have the same numbering. *See id.* at SHOALS00000847.

²⁵ This approach is also consistent with the Examiner’s earlier statements regarding the lack of a generic claim. In prosecution, an unelected species is generally only considered for allowance upon allowance of a generic claim. RIB Ex. 3 at SHOALS00000471; *St. Jude Med., Inc. v. Access Closure, Inc.*, 729 F.3d 1369, 1378 (Fed. Cir. 2013) (“[I]f no generic claim is found allowable, then the election of species will create a restriction under 35 U.S.C. § 121.); 37 C.F.R. § 1.146 (“his or her claim will be restricted if no claim to the genus is found to be allowable”). No generic claim was ever identified as allowable in prosecution. At the time of the election of species requirement, application claims 1-9 already required a “first photovoltaic connector engaged with said first end” and the Examiner stated (without traverse) that no claims appeared to be generic. *See* RIB Ex. 3 at SHOALS00000443-44 (showing original claims); SHOALS00000469-70 (setting forth “election of species” requirement based on distinction between Figs. 5-12 and Figs. 13-16 and stating that “currently, ***no claims appear to be generic.***” (emphasis added)); *id.* at SHOALS00000475 (applicant electing “Species 1 . . . (Claims 1-9, Figures 5-12) . . . without traverse”). The Examiner’s withdrawal of “the restriction requirement” was directed to claims that “require[] all the limitations of an allowable claim.” RIB Ex. 3 at SHOALS00000837.

the language of the claims” and “the [other] intrinsic evidence”); *Barrday, Inc. v. Lincoln Fabrics Inc.*, No. 2022-1903, 2023 WL 7871688, at *6 (Fed. Cir. Nov. 16, 2023).

Both parties point to additional statements in the prosecution history that they claim support their proposed interpretations. These arguments do not provide clear guidance that controverts the evidence discussed above. Respondents and Staff point to a proposed (but not entered) amendment by the applicant that would have specified that a “proximal portion” of the connector was “engaged with” the first end of the assembly, depicted in the annotated figure submitted with the proposed amendment at right. RIB at 19; SB at 23-24; RIB Ex. 3 at SHOALS00000521.



Complainant points to the statement by the Examiner that a prior art reference, Jonczyk, disclosed an upper connector “electrically ‘engaged’” with the fuse. CIB at 20; RIB Ex. 3 at SHOALS00000573. This single statement by the Examiner—not the applicant—does not change the analysis given the guidance provided by the specification and claims. *Cf. Ethicon Endo-Surgery, Inc. v. U.S. Surgical Corp.*, 93 F.3d 1572, 1578 (Fed. Cir. 1996) (affirming district court claim construction despite arguments that examiner took a broader view). Complainant further contends that the provisional application’s Figure 2 disclosed an assembly “engaged with” a downstream photovoltaic connector, and that Figure 2 of the provisional application corresponds to Figure 6 of the ’739 Patent. CRB at 11-12. The correspondence between provisional Figure 2 and Figure 6 is not clear, as for example, the connector pin 35 of Figure 6 does not appear in provisional Figure 2 and the text of the provisional application relating to Figure 2 resembles that for Figure 16 of the ’739 patent. *Compare* RIB Ex. 2 at SHOALS00007132, 7135, Fig. 2 with ’739 Patent, Fig. 6, 2:31-33; *see also* Tr. (Resp. counsel) at 113:11-114:5. Moreover, the claims of the provisional application did

not recite the “photovoltaic connector engaged with” limitations. *See* RIB Ex. 2 at SHOALS000007133.²⁶

Accordingly, “photovoltaic connector engaged with said [first/second] end” is construed to mean “photovoltaic connector physically or mechanically connected to the corresponding said [first/second] end.” The limitation is not met by simply an electrical connection via wire.²⁷

²⁶ Complainant also asserts that the claims of the ’739 patent use “engaged” or “engaging” elsewhere in a manner indicating that “engagement” can refer simply to an electrical connection by wire. *See* Tr. (Compl. counsel) at 99:10-100:3; CRB at 10-11 (citing to ’739 patent, cls. 10, 15, 16). However, those claim limitations pertain to engagement of portions of a wire harness and thus a physical or mechanical connection for such elements would necessarily occur by wire. *See* cl. 10 (referring to fuse assemblies “engaged only with said branch wires”); *id.* cl. 15 (referring to “[e]ngaging each terminal branch of said wire harness”). Complainant does not persuasively explain how the use of “engaged” in those contexts refers merely to an electrical connection or controverts the evidence discussed above. *See* RRB at 10.

²⁷ While the undersigned has not used the “fit together” language proposed by Respondents and Staff, this is not a substantive difference in view of the arguments provided by counsel. Respondents and Staff explained that their “fit together” construction requires a direct physical or mechanical connection and is not met merely through an electrical connection by wire. *See, e.g.*, RRB at 9 (“where there exists a potentially claimed connector, the fuse ends are mechanically engaged with the connector”); *id.* at 8 (disagreeing that “engaged with” only “requires a simple electrical connection . . . and no mechanical engagement”); SB at 21 (“[t]he dispute surrounding this claim term focuses on whether the phrase ‘engaged with’ requires a physical attachment”) (internal emphasis omitted). Complainant also recognized that this is the distinction captured by the claim construction dispute. *See* CIB at 15 (“Respondents’ and Staff’s proposed constructions suggest that . . . a direct physical connection is required . . . However, it is axiomatic that the claimed photovoltaic connector is an electrical connector, requiring only an electrical connection.”); Tr. (Compl. counsel) at 98:24-99:3 (“The real issue here is Respondents and Staff say that the photovoltaic connector needs to have a direct physical connection with the fuse, and Shoals’ position is that the connector just needs to have an electrical connection with the fuse.”); *id.* at 100:13-15 (“[e]ngagement may be through wire connection, which is an electrical connection. It doesn’t need to be hardwired or necessarily physically connected.”).

d. “primary mold” (’153 patent, claims 21, 24)

Claim Language	Complainant	Respondents	Staff
“primary mold”	No construction necessary; Plain and ordinary meaning, such as “molded material that acts to protect against environmental factors”	“innermost mold” or in the alternative, “innermost mold or otherwise only mold” ²⁸	“shape of material molded over a piece or part that seals against environmental factors” Alternatively, “innermost mold” (see “undermold” in ’739 Patent)

The parties dispute the claim element “primary mold” as it appears in the ’153 patent in claims 21 and 24. In both claims, the term “primary mold” is claimed as a mold that *inter alia* “fully encases the *nexus* so as to substantially seal the *nexus* from external environmental conditions.” ’153 patent, cls. 21, 24.

In briefing, Complainant contended that the Staff and Respondents’ proposal of “innermost mold” improperly required the existence of multiple molds (*e.g.*, a primary mold and a secondary or overmold) even though the claims do not require any mold beyond the claimed “primary mold.” CRB at 15; *see also* CIB at 23. In response, Respondents and Staff explained that the proposal of “innermost mold” did not require additional molds, and that in embodiments where there is a single mold, the only mold would still be the “innermost mold,” a position that Respondents adopted as an alternative construction leading up to the *Markman* hearing. SB at 34; RRB at 11; Resp. Slides at 97 (“Respondents’ Alternative Construction: “innermost mold or otherwise only mold”).

²⁸ Respondents proposed the alternative construction after briefing and before the *Markman* hearing. *See* Resp. Slides at 97; RIB at 26.

At the *Markman* hearing, Complainant maintained the dispute as to “primary mold,” rejecting Respondents’ proposed alternative construction as ambiguous, arguing that the first part of the construction (“innermost mold”) would exclude embodiments with only one mold, while the second part of the construction (“or otherwise only mold”) would exclude embodiments with more than one mold. Tr. (Compl. counsel) at 135:25-136:7. Complainant additionally argued that the construction was incorrect because it would exclude “an intervening layer, some kind of insulation layer or heat shrink” between the nexus and the “primary mold.” Tr. (Compl. counsel) at 136:25-137:4. Complainant argued that a “heat shrink or insulated layer could be a mold as well.” Tr. (Compl. counsel) at 137:10-11. Complainant also contended that no “special meaning” was necessary. Tr. (Compl. counsel) at 151:7-12. Respondents at the *Markman* hearing argued, *inter alia*, that the “primary mold” must be in a particular position regarding the nexus in order to “encase” it. See Tr. (Resp. counsel) at 153:6-154:4 (“if we add something else, it wouldn’t encase the nexus, if there is something in between. That first mold must do that to seal it from external environmental conditions”).

Upon consideration of the parties’ arguments and the intrinsic record, the undersigned finds that the term “primary mold” is defined in part by the surrounding claim language, which requires it to be a “mold fully encasing the nexus so as to substantially seal the nexus from external environmental conditions.” See *Phillips*, 415 F.3d at 1314 (“the claims themselves provide substantial guidance as to the meaning of particular claim terms”). To the extent there is more than one mold with these characteristics, the “primary mold” is the innermost of such molds.

First, the context of the claim language indicates that the “primary mold” is a molded material with a specific defined function—“fully encas[ing] the nexus so as to substantially seal

the nexus from external environmental conditions.” *See* ’153 patent, cl. 21. 24. The parties do not dispute this function of the “primary mold.” *See* Tr. (Comp. counsel) at 150:13-14 (“[T]he primary mold fully encases the nexus.”); Tr. (Resp. counsel) at 140:6-7 (“We’re focused on the primary mold, which is the first mold, the inner mold that fully encases the nexus.”); RRB at 11-12.

Second, the use of the term “primary” in the claim term (“primary mold”) should be given meaning. *See* RIB at 26-27; SB at 34 (“Shoals’ construction . . . provides no meaning to ‘primary.’”). Dependent claim 23, for example, claims a “secondary mold surrounding the primary mold and forming an undermold-overmold interface at an outer surface of the primary mold.” ’153 patent, cl. 23. This contrast between a “primary mold” and a potential “secondary mold” indicates that the applicant is providing an order to the mold layers. *See, e.g.*, Respondents’ Ex. 21²⁹ (dictionary definition of “primary” as “of first rank or importance or value; direct and immediate rather than secondary”). This construction is also consistent with the applicant’s decision to use the term “*primary* mold” (as opposed to “undermold,” which is used in claim 1 of the ’153 patent).³⁰

Accordingly, the undersigned finds that the term “primary mold” should be construed as a “mold fully encasing the nexus and substantially sealing the nexus from external environmental conditions.” To the extent there is more than one mold with these characteristics, the “primary mold” is the innermost of such molds.³¹

²⁹ Additional dictionary definitions were filed with the December 15, 2023 Updated Joint Claim Construction Chart and numbered as additional exhibits to Respondents’ briefing. *See* EDIS Doc. ID 810489.

³⁰ There is no reference to a “primary mold” in the specification, which uses the terms “undermold” and “overmold.”

³¹ This Order does not address whether there could be some partial molding material, which does not fully encase the nexus so as to substantially seal it from external environmental conditions, underneath the

e. “aperture” (’254 patent, claims 1 & 7 and ’153 patent, claims 1, 21, 24)

Claim Language	Complainant	Respondents	Staff
“aperture”	“an opening into or through something; an opening, an open space between portions of matter” “all or part of a pathway for the [drop line / feeder cable] within the [undermold / primary mold]”³²	Invalid under § 112 for lack of written description or indefiniteness, or, in the alternative: “entire pathway of the [feeder cable/drop line wire] within the [undermold/primary mold] when viewed as if the [feeder cable/drop line wire] were removed” Or “pathway into the [undermold/primary mold] along a single axis”	“entire pathway of the [feeder cable/drop line wire] within the [undermold/primary mold] when viewed as if the [feeder cable/drop line wire] were removed” Or “a three-dimensional hole or volumetric outline thereof extending from the outer surface of the [undermold/primary mold] and which defines a pathway into the void defined by the inner surface of the [undermold/primary mold] when the underlying piece or part is removed” Alternatively, invalid under § 112 for lack of written description and/or indefiniteness

The parties identified the term “aperture,” standing alone, as a disputed term for construction. Claim limitations relating to a “first aperture” and “second aperture”—including

“primary mold.” To the extent any such dispute exists (*see* Tr. (Compl.) at 150:13-23), it will be addressed later in the investigation. This issue, to the extent disputed, may present fact questions depending on the type and degree of any such “molding.” It may also depend on whether there are claim construction or factual issues surrounding the meaning of “encase.” *See* Tr. (Resp. counsel) at 153:4-154:4.

³² Complainant’s alternative construction was first introduced in the Updated Joint Chart on December 26, 2023.

their relationships to the claimed feeder cable and drop line, to each other, and to the undermold—were proposed by the Examiner during prosecution of the ’254 patent and accepted by the applicant. *See* CRB at 21; SB at 38; RIB Ex. 5 at SHOALS000001223-24, 1227-40. Similar “aperture” limitations were then proposed by applicant in the continuation application that issued as the ’153 patent, including the addition of “third aperture” limitations. *See* RIB Ex. 8 at SHOALS00001392-94, 1473-76, 1621-1625.³³

Over the course of briefing and the *Markman* hearing, the parties appeared largely to agree that an “aperture” (as used in the claims at issue) corresponds to a pathway occupied by either a feeder cable (for the “first aperture”) or a drop line (for the “second aperture” and/or “third aperture”). *See, e.g.*, RIB at 32 (“the parties do not dispute that the claimed ‘apertures’ may include at least the empty space within a material where, *e.g.*, the feeder cable and drop line enter, if they were to be removed”); RRB at 18 (“The three-dimensional aperture must define a pathway for the ‘feeder cable / drop line,’ which begins from the outer surface of the ‘undermold / primary mold’ and extends into the ‘undermold / primary mold.’”); CRB at 17 (“Shoals, Staff and Voltage all describe the various apertures as ‘pathways’ through the undermold for certain structures. Specifically, the first aperture is the feeder cable’s pathway through the undermold, while the second and third apertures are pathways (again, through in the undermold) of drop lines.”); SB at 37 (“[T]he basic concept for ‘aperture’ can be simplified and shortened to something like ‘entire pathway of the [feeder cable/drop line] within the undermold, when viewed as if the [feeder cable/ drop line] were removed.”); Tr. (Staff) at 196:24-197:1 (“the entire pathway of the feeder cable/drop line within the undermold . . . I think that’s what we’ve

³³ The parties agree that the “aperture” term in dispute is not intended to cover the “attachment aperture” set forth in claim 4 of the ’153 patent. *See* Joint Updated Claim Construction Chart at 3 n.2.

been talking about”); Tr. (Compl. counsel) at 155:8-10 (“The essential agreement on aperture is that it is a pathway. It is a pathway for wires or cables into the mold. And we see this in Respondents’ brief where they talk about a pathway into the void defined by the mold, a pathway into the undermold.”); *id.* at 156:7-13 (“first aperture” is “pathway . . . for this big feeder cable into the mold to the nexus” and for the “second and third apertures it’s the pathway into the mold for the smaller cables, the drop lines”); Tr. (Resp. counsel) at 179:5-9 (“second aperture” could be “the hole that . . . the drop line is in”). In accordance with the claim language and these statements, the undersigned finds that the term “aperture” refers to a pathway within the undermold or primary mold for a feeder cable or drop line (when viewed as if the feeder cable/drop line were removed).

With respect to the issue of whether the “aperture” corresponds to the “entire” pathway for the feeder cable and/or drop line (as indicated in Respondents’ and Staff’s proposed constructions), or to any part thereof (as suggested by Complainant’s proposed construction), the undersigned finds that the “aperture” terms refer to the entire pathway for the claimed feeder cable (for the “first aperture”) or claimed drop line (for the “second aperture” and “third aperture”). Given Complainant’s agreement that the “aperture” terms should be construed as pathways for certain structures (*see* CRB at 17), there is no persuasive basis for construing “aperture” to only correspond to any part of such a pathway. Moreover, the fact that the claims differentiate between apertures that extend “continuously through said undermold” (*see, e.g.,* ‘254 patent, cls. 1, 7) and apertures “only partially extending through said undermold” (*see id.*) indicates that the apertures should be considered as an entire pathway. If taken to be any subset of that pathway, any aperture could be found to “only partially extend[]” through an undermold.

See Part IV.g *infra*.

Based on the above, and at least at this stage of the investigation, the evidence does not clearly and convincingly show that the “aperture” terms are indefinite.³⁴ Accordingly, the undersigned construes “aperture” as the “entire pathway of the [feeder cable or drop line] within the [undermold or primary mold], when viewed as if the [feeder cable or drop line] were removed.”

³⁴ Respondents raised various issues at the hearing relating to, *e.g.*, the possibility of changes in the diameter of an aperture, two different drop lines using a single cable, or pathways that bend. *See* Tr. (Resp. counsel) at 181:8-184:6. Given the current state of the record, the undersigned does not find that the issues show clearly and convincingly that the claim is indefinite. This issue may be revisited after the evidentiary hearing.

f. “second aperture . . . parallel to said first aperture” (’254 patent, claims 1 & 7)

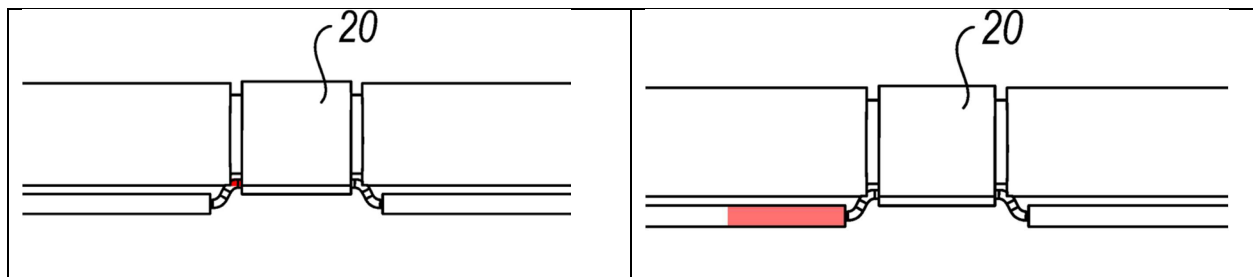
Claim Language	Complainant	Respondents	Staff
“second aperture . . . parallel to said first aperture”	No construction necessary beyond the construction of “aperture”; Plain and ordinary meaning, such as “an axis of a second aperture [is] parallel to an axis of a first aperture”	“the initial length starting from the outer surface of the undermold or otherwise the entire length of the second aperture [is] parallel to the length of the first aperture” <i>See the proposed construction of “aperture” above</i> or “second aperture . . . having only one axis in the longitudinal direction parallel to the only axis of the first aperture in the longitudinal direction”	“the initial or entire length of the second aperture [is] parallel to the length of the first aperture” <i>See the proposed construction of “aperture” above</i>

Claims 1 and 7 of the ’254 patent require that the claimed “second aperture” be “parallel to said first aperture.” The parties dispute what portion of the first drop line pathway (*i.e.*, the “second aperture”) is to be evaluated to determine whether the “first aperture” and the “second aperture” are parallel.³⁵

Complainant contends that, for purposes of determining the “parallel” requirement, it is sufficient for any portion of the “second aperture” to be parallel to the “first aperture.” *See* Tr. (Compl. counsel) at 204:13-16 (“[A]gain, any portion of the aperture for the drop line can be

³⁵ The parties focus on the “second aperture” rather than the “first aperture.” As discussed *supra*, the “first aperture” corresponds to the feeder cable pathway in the undermold.

parallel to the aperture for the feeder line and meet this requirement of parallelism.”); *id.* at 205:20-22 (“the parallelism requirement can be met as long as it’s parallel at any point of the second aperture’s pathway”); Compl. Slides at 75. Complainant argues that if construed to require the entire length of the second aperture to be parallel to the first aperture, it would exclude certain embodiments, such as that depicted in Figures 35 through 38, where the drop line (and thus the second aperture) bends toward the feeder cable (and thus the first aperture). Compl. Slides at 73; Tr. (Compl. counsel) at 205:15-22. For example, Complainant identified two portions of the drop line (portions highlighted in red by Complainant) that are parallel to the feeder cable in the embodiment at Figs. 35-38 of the ’254 patent, although the drop line is not parallel at all points:

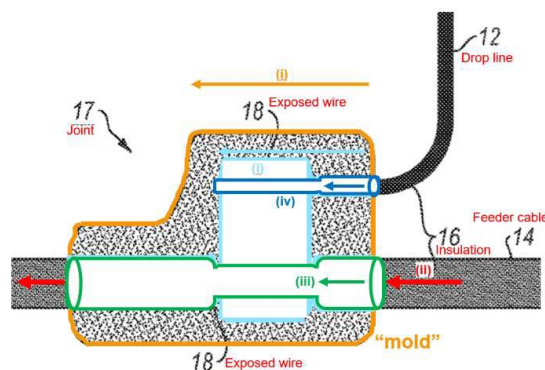


Compl. Slides at 73-74; Tr. (Compl. counsel) at 203:24-205:2.³⁶ Complainant also argues that Respondents’ and Staff’s proposal that an “initial length” is parallel is redundant and contrary to the patent’s description of where the drop line (and thus second aperture) terminates and begins. CRB at 18.

Respondents and Staff argue that Complainant’s proposal—if adopted—would result in a claim that is indefinite, because there are “potentially . . . infinite sub-apertures within the pathway of the aperture,” RRB at 15-16, that could be arbitrarily selected and labeled as parallel.

³⁶ Although labeled as “Fig. 35,” the figures depicted in Complainant’s slides are the versions of the figures that appear in the ’153 patent, not the ’254 patent.

RRB at 18-19; *see also* SB at 41-42. Respondents assert that to the extent embodiments depicting bends in the drop line wire and second aperture are excluded, that is permissible where “it is plainly at odds with the intrinsic claim language.” RRB at 20 (citing *TIP Sys., LLC v. Phillips & Brooks/Gladwin, Inc.*, 529 F.3d 1364, 1373 (Fed. Cir. 2008)). Staff and Respondents argue that the “aperture” language was added by the Examiner to overcome references, such as Jonczyk, where the drop line is depicted as entering the mold at an angle. SB at 38-39; RIB at 45. Staff and Respondents contend that the amendment was intended to cover the embodiment depicted in Figure 7 of the ’254 Patent, which depicts a parallel drop line and feeder cable. RRB at 43-44; SB at 38.



RIB at 43 (annotated version of ’254 Patent, Fig. 7).

Upon consideration of the parties’ arguments and the intrinsic record, including the prosecution history, the undersigned construes the term “second aperture . . . parallel to said first aperture” according to its plain and ordinary meaning, which require the second aperture, considered as a whole, to be parallel to the first aperture, considered as a whole. The claim language does not state that “any portion” or part of the second aperture is parallel to the first

aperture.³⁷ Thus, the most natural reading of this language is that it refers to each aperture considered as a whole. *Cf. Norgren Inc. v. Int’l Trade Comm’n*, 699 F.3d 1317, 1320, 1323 (Fed. Cir. 2012) (“four-sided, generally rectangular clamp” means that “the clamp as a whole, and not merely portions of it, must be four-sided and generally rectangular”); *Schoell v. Regal Marine Indus., Inc.*, 247 F.3d 1202, 1209 (Fed. Cir. 2001) (in claim requiring a “V-shaped keel,” application of the adjective “‘V-shaped’ to the forward keel rather than to a portion of the forward keel suggests that the entire forward keel must be V-shaped”), *abrogation on other grounds recognized by McGinley v. Luv’N’Care Ltd.*, 819 Fed. Appx. 913 (Fed. Cir. 2020); *Certain Electrical Connectors and Cages, Components, and Products Containing the Same*, Inv. No. 337-TA-1241, Comm’n Op. at 25 (Sept. 30, 2022) (EDIS Doc. ID 781376) (plain and ordinary meaning of “a contact tail . . . perpendicular to . . . the printed circuit board” requires “the contact tail, considered as a whole, to be perpendicular to the printed circuit board”); *Cacace v. Meyer Mktg. (Macau Commercial Offshore) Co.*, 812 F. Supp. 2d 547, 554 (S.D.N.Y. 2011) (“side wall [which] has an inside surface having a curvilinear profile in a plane that is normal to the cooking surface” implies, according to its plain meaning, “the inside surface of the side wall is curved along its entire length”). This approach would, for example, read onto at least the Figure 7 embodiment of the ’254 patent. Moreover, the ’153 patent, which issued from a continuation of the ’254 patent application, includes limitations drawn to a “first aperture” and “second aperture” but does not include the “parallel” requirement in any of its independent claims. *See* ’153 patent, cls. 1, 21, 24.³⁸

³⁷ Moreover, the claim language shows that where the applicant sought to refer to “partial” aspects, it knew how to do so. Claim 1 of the ’254 patent, for example, refers to the second aperture “only partially extending” through the undermold.

³⁸ The parties disagree regarding the degree to which Figure 7 is a working embodiment but no expert testimony was provided on this issue. *See* Tr. (Compl. counsel) at 158:9-16; *see id.* (Resp. counsel) at

Accordingly, Complainant's proposal that "an axis" of the first aperture is parallel to "an axis" of the second aperture—to the extent it means that the limitation is met if any sub-length of the second aperture is parallel to any sub-length of the first aperture—is rejected. Rather, each aperture taken as a whole must be considered.³⁹

Respondents and Staff's "initial length" proposal (which is presented as an alternative to their "entire length" proposal) appears to be intended to encompass certain embodiments, such as the Figure 35 embodiments, above, which depict "bends" in the drop line wire pathway that are not parallel. *See, e.g.*, SB at 43. This proposal, however, controverts the plain and ordinary meaning of the claim language, as discussed above. Moreover, Respondents and Staff do not persuasively explain how to distinguish "the initial length" from the remainder of the "second aperture," raising indefiniteness issues.⁴⁰

167:25-168:18; *id.* (Staff) at 232:18-22. The undersigned does not determine at this time whether the Figure 35-38 embodiment might include only minor deviations from parallelism and might also meet this "parallel" limitation. *See* n.39 *infra*. To the extent it does not, the Federal Circuit has recognized that, where required by the intrinsic evidence, there may well be unclaimed embodiments. *See, e.g., Barrday, Inc. v. Lincoln Fabrics Inc.*, No. 2022-1903, 2023 WL 7871688, at *6 (Fed. Cir. Nov. 16, 2023) (Federal Circuit precedent "is replete with examples of subject matter that is included in the specification, but is not claimed."); *TIP Sys., LLC v. Phillips & Brooks/Gladwin, Inc.*, 529 F.3d 1364, 1373 (Fed. Cir. 2008) (citations omitted) (declining "to construe the claim term to encompass the alternative embodiment" because such a construction "would contradict the language of the claims" and "the [other] intrinsic evidence").

³⁹ At the *Markman* hearing, Complainant argued that "parallel" in the '254 patent need only be "something close to parallel, not necessarily perfect parallelism," pointing to a statement in the specification that "approximations allow variances of +/- 10%" unless "otherwise noted or nonsensical such as a length less than zero." '254 Patent, 6:36-37; Tr. (Compl. counsel) at 205:10-14. Apart from this statement, the parties did not focus on construction of the term "parallel" as part of the *Markman* proceedings, but rather on which portions of the apertures should be evaluated when making the "parallel" determination. At this stage of the proceedings, the undersigned does not hold that perfect parallelism is required. *Cf. Electrical Connectors and Cages*, Comm'n Op., at 26 (construction requiring "contact tail, considered as a whole, to be perpendicular" did not require that it "must be entirely perpendicular"); *San Disk Corp. v. Round Rock Rsch. LLC*, 2013 WL 1899790, at *4-5 (N.D. Cal. May 7, 2013) (ordinary meaning of "perpendicular" can encompass "deviation from theoretical perfection").

⁴⁰ As noted *supra*, the language requiring certain geometric configurations for the apertures was suggested by the Examiner during prosecution and accepted by applicant without discussion. Respondents and Staff point to the disclosures of Joncyk, where the second aperture purportedly extends into the mold at an

Under the circumstances and intrinsic record here, the plain language of the claims governs, and accordingly, the undersigned construes the term “second aperture . . . parallel to said first aperture” according to its plain and ordinary meaning, which requires that the second aperture, considered as a whole, is parallel to the first aperture, considered as a whole.

g. “[second/third] aperture . . . extending partially” and “first aperture . . . extending continuously” terms (’254 patent, claims 1& 14, ’153 patent, claims 1, 21, 24)

Claim Language	Complainant	Respondents	Staff
“second aperture only partially extending through said undermold (’254 patent, claims 1, 7)	No construction necessary beyond the construction of “aperture”; Plain and ordinary meaning	“[second/third] aperture that does not extend completely through the [undermold/primary mold]”	“[second/third] aperture that does not extend completely through the [undermold/primary mold]”
“second aperture extending partially through the [undermold/primary mold]” (’153 patent, claims 1, 21, 24)		<i>See</i> the proposed construction of “aperture” above	<i>See</i> the proposed construction of “aperture” above
“third aperture extending partially through the [undermold/primary mold]” (’153 patent, claims 1, 21, 24)		or “entire pathway of [first/second] drop line wire starting from one opening in the outer surface of the [undermold/primary mold] for a cable to enter, but that does not exit through . . . ” <i>See</i> Ex. 24 at slide 124; 152.	

angle, to support their “initial length” alternative construction. SB at 38-39; RIB at 45. The Examiner did not, however, reference Joncyk in making the “second aperture” amendments, and Complainant asserts that Joncyk did not disclose a “second aperture” at all, never mind one that is not parallel. CRB at 19. The prosecution history fails to provide any clear guidance to depart from the plain and ordinary meaning.

“said first aperture extending continuously through said undermold (’254 patent, claims 1, 7) “first aperture extending completely through the [undermold/ primary mold]” (’153 patent, claims 1, 21, 24)	No construction necessary beyond the construction of “aperture”; Plain and ordinary meaning	Plain and ordinary meaning, and no construction necessary beyond the construction of “aperture” or “feeder cable pathway connecting two openings in the outer surface of the [undermold/primary mold] for the cable to enter and exit through . . . ” <i>See</i> Ex. 24 at slide 124; 152.	Plain and ordinary meaning, and no construction is necessary beyond the construction of “aperture” and claim term #7 above.
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The parties’ disputes with relation to the “extending partially” and “extending continuously” terms are addressed here together.

The parties do not appear to fundamentally dispute the meaning of “first aperture extending [continuously/completely]”; all parties appear to agree that the first aperture follows the feeder cable, which must extend from one side of the mold through the nexus (*e.g.*, a compression lug) and then through to the other side of the mold. CRB at 17 (“Everyone seems to agree that for the first aperture to extend continuously through the undermold, that pathway must connect two openings in the outer surface of the undermold, for the feeder cable to enter and exit through.”); Tr. (Resp. counsel) at 227:23-25 (“[w]e already know that the cable goes all the way through with respect to the main line of the feeder cable”); *id.* at 229:3-5 (“And the aperture in these claims for the feeder cable goes completely through. And it goes from one end to the other, enters, exits.”); SB at 47-48 (“extending [continuously/completely] through” terms do not require further construction once “aperture” is defined). At least at this stage of the

investigation, it does not appear that any construction of the “[continuously/completely] through” terms is necessary beyond the construction of “aperture” above.

The dispute as to “extending partially,” as presented at the *Markman* hearing, appears to concern how to determine where drop line apertures (“second” or “third” apertures) terminate. This may be relevant to scenarios involving multiple drop lines, which may apparently be comprised of a single cable. Tr. (Staff) 197:16-18 (“[ALJ Bhattacharyya:] You’re saying one cable would somehow comprise two drop lines? [Mr. Shin]: Yes, Your Honor.”); Tr. (Resp. counsel) at 184:11-15 (“So, Your Honor, I think – the solar industry would characterize these as two different drop lines.”); Tr. (Compl. counsel) at 201:21-23 (“[A]gain, as I think Mr. Ou announced, in the industry, that would be considered two drop lines.”).

Upon consideration of the parties’ arguments and the intrinsic evidence, and consistent with the construction of “aperture” above, the undersigned tentatively holds that the “second aperture” and “third aperture” terms correspond to the pathway in the undermold/primary mold of the claimed “first drop line” and “second drop line,” respectively.⁴¹ The claim language ties the “second aperture” and the “third aperture” to these drop lines and, as discussed *supra*, the “aperture” terms are defined with reference to pathways for the claimed drop line(s) and/or feeder cable. *See, e.g.*, ’153 Patent, cl. 1 (“second drop line extends from the third aperture”); ’254 Patent, cl. 1 (“said first drop line extending from said second aperture”).

To the extent any party believes that any holdings in this Order warrant supplemental expert disclosures or procedures before the hearing that the parties could not reasonably have

⁴¹ This issue may be revisited if appropriate. *See, e.g., Pressure Prods. Med. Supplies, Inc. v. Greatbatch Ltd.*, 599 F.3d 1308, 1316 (Fed. Cir. 2010) (“courts may engage in a rolling claim construction . . . as [the court’s] understanding of the technology evolves”).

provided previously, the parties should meet and confer and jointly submit any proposal(s) therefor, together with justification therefor (and identifying any disputes), by February 27, 2024.

SO ORDERED.



Monica Bhattacharyya
Administrative Law Judge